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THE GALL MIDGES (DIPTERA: CECIDOMYIIDAE) OF *MIKANIA GLOMERATA* (ASTERACEAE) IN SOUTHEASTERN BRAZIL

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Abstract.—A survey of *Mikania glomerata* Sprengel (Eupatorieae: Asteraceae) in southeastern Brazil resulted in the discovery of eight kinds of galls made by eight species of gall midges. All of the galls and their gall makers are described. Seven of the gall makers are new to science and two new genera, ***Liodiplosis* Gagné** and ***Mikaniadiplosis* Gagné,** are described to contain four of the seven new species. The eight gall-making species are: ***Alycaulus globulus* Gagné, *Asphondylia glomeratae* Gagné,** *Asphondylia moehni* Skuhravá, ***Liodiplosis cylindrica* Gagné, *Liodiplosis conica* Gagné, *Liodiplosis spherica* Gagné, *Mikaniadiplosis annulipes* Gagné,** and ***Perasphondylia mikaniae* Gagné.** In addition, another gall midge new to science, ***Contarinia ubiquita* Gagné,** is described that lives gregariously in the galls of five of the eight kinds of galls described.

Key Words: Neotropical, gall midges, gall makers, Asteraceae

This work is part of an ongoing study outlined by Monteiro et al. (1994) on the ecology of insect galls of the Brazilian Atlantic Forest Region, including the restinga or coastal shrub zone. One of the first tasks in studying these galls is the description of their inhabitants, most of them new to science. In this paper we describe the galls and gall midges associated with the eight galls found on *Mikania glomerata* Sprengel (Eupatorieae: Asteraceae).

Mikania glomerata is a common plant of the Atlantic forest edge and interior that extends from southeast and southern Brazil into Paraguay and Argentina (King and Robinson 1987). It is one of 415 species of the pantropical but chiefly Neotropical genus *Mikania* (King and Robinson 1987). This plant is much used in popular medicine, especially as an expectorant (Oliveira et al. 1987). Its numerous and conspicuous flowers bloom from August to December and are much visited by the honeybee, *Apis mellifera* L. (Cortopassi-Laurino and Ramalho 1988). Honey from *M. glomerata* is commercially important.

During this study, mainly within Rio de Janeiro State, we found nine species of gall midges associated with eight galls. The galls are described here and illustrated in Figs. 1–8. Eight of the nine species of Cecidomyiidae are new to science and are described and named here, and the ninth is redescribed. The species and their galls are as follows, by tribe, species, and gall type:

Alycaulini

Alycaulus globulus Gagné in slight epidermal leaf swelling (Fig. 1)

Asphondyliini
- *Asphondylia glomeratae* Gagné in leaf petiole or vein blister (Fig. 2)
- *Asphondylia moehni* Skuhravá in stem swelling (Fig. 3)
- *Perasphondylia mikaniae* Gagné in bud gall (Fig. 8)

Cecidomyiini
- *Contarinia ubiquita* Gagné, an inquiline in various galls

Clinodiplosini
- *Liodiplosis cylindrica* Gagné in cylindrical leaf or branch gall (Fig. 5)
- *Liodiplosis conica* Gagné in conical leaf or branch gall (Fig. 6)
- *Liodiplosis spherica* Gagné in spherical leaf or branch gall (Fig. 7)

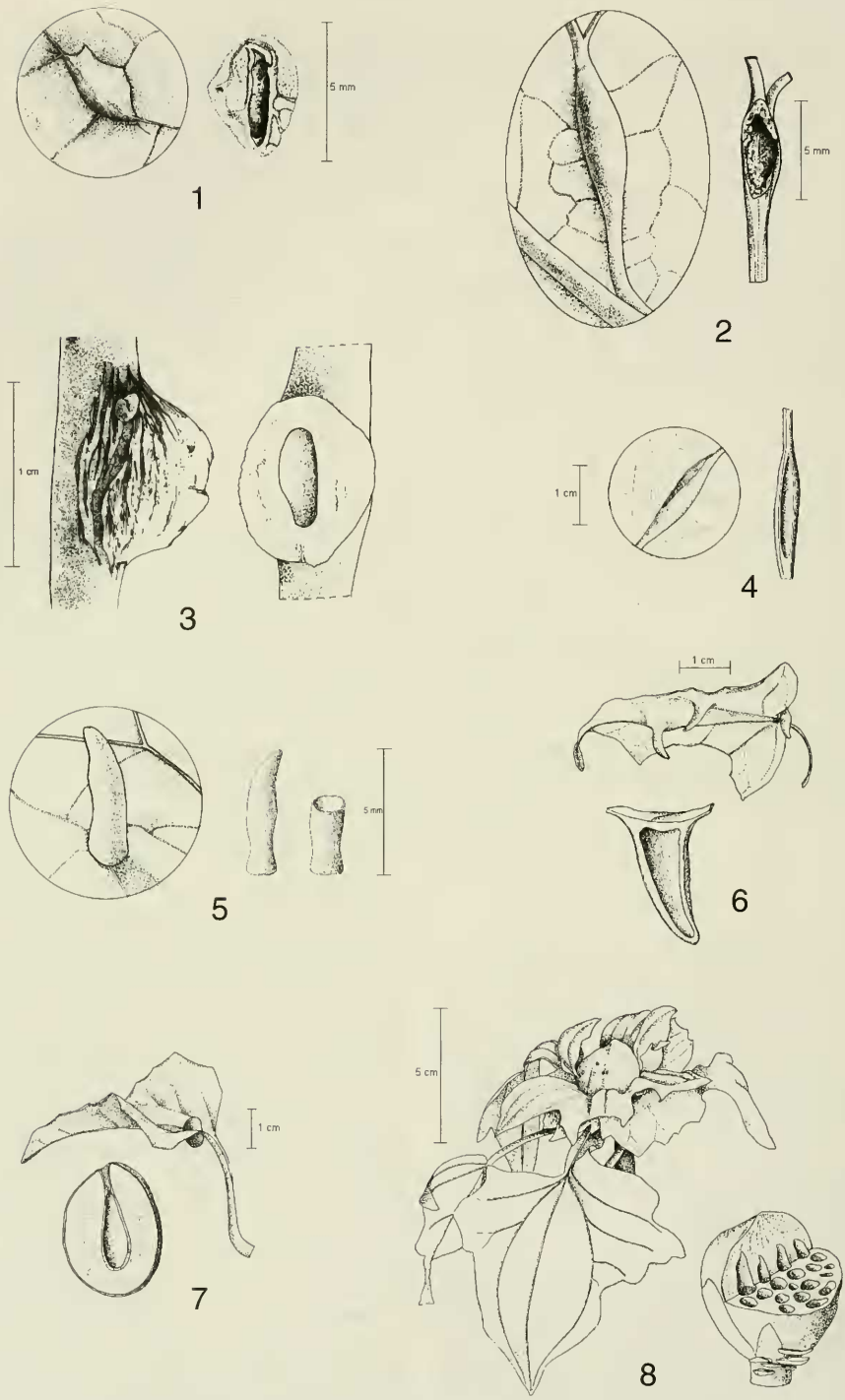
Supertribe Cecidomyiidi, unassigned to tribe
- *Mikaniadiplosis annulipes* Gagné in leaf vein, petiole, or branch swelling (Fig. 4)

As can be seen from the list, these genera and species are a diverse array of gall midges. The six genera belong to five separate tribes of Cecidomyiidae. Even assuming that the two species of *Asphondylia* and three species of *Liodiplosis* are more closely related to one another than to their congeners, which cannot be determined here, this means that galls on the host plant are caused by at least five distinct lines of gall-makers and that the inquiline comes from yet another line. The inquiline, *Contarinia ubiquita,* belongs to a large, cosmopolitan genus of about 300 species whose larvae are otherwise mostly gall makers or free living in flower heads.

Two genera are described as new to science: *Liodiplosis* with three new species and *Mikaniadiplosis* with one. Neotropical gall midges are extremely poorly known (Gagné 1994) and many more genera will need to be described as more species are uncovered that do not fit satisfactorily into existing genera. With the eventual discovery of more species, the relationships among this fauna should become clearer. A case in point is the new species, *Perasphondylia mikaniae,* only the second species described in *Perasphondylia.* The two species, both forming bud galls on the tribe Eupatorieae (Asteraceae), now form a satisfyingly monophyletic group.

All except one species are described or redescribed from their adult, pupal, and larval stages. The exception is *Contarinia ubiquita,* from which we were not successful in obtaining pupae or adults. This species is nonetheless common as larvae, occurring as an inquiline in the galls of five other species. Because this paper treats all known species of gall midges from *M. glomerata* and because two of us, Oda and Monteiro, will be referring to *C. ubiquita* in future ecological work, it is desirable to describe what we know and name it at this time, despite our knowing only larvae.

New noteworthy realizations are reported here concerning the morphology of these gall midges. Species of the subtribe Asphondyliina, which includes *Asphondylia* and *Perasphondylia,* have lost the pair of trichoid sensilla commonly seen in other gall midges at the anterior edge of the adult abdominal terga and sterna. Two characters are noticed for *Liodiplosis* that seem to be shared with other Clinodiplosini. These are the bare, non-setulose venter of the male hypoproct and the smooth horizontal band on the abdominal terga of the pupal abdomen just posteriad of the row of dorsal papillae. It appears that Clinodiplosini which pupate in their galls have large tergal spines that serve to help in escaping from the galls, spines that are not present in species that drop to the soil to pupate. The larva of *Mikaniadiplosis annulipes* has a pair of large corniform papillae and 3 pairs of small setiform papillae on the terminal segment that are reminiscent of *Contarinia* spp., but the otherwise great differences between the two genera indicate that the larval characteristics they share are separately derived.



Figs. 1–8. Cecidomyiid galls of *Mikania glomerata*, entire and in section, the sectioned galls enlarged in some. 1, Leaf epidermis swelling of *Alycaulus globulus*. 2, Vein swelling of *Asphondylia glomeratae*. 3, Stem swelling of *Asphondylia moelmi*. 4, Leaf vein swelling of *Mikaniadiplosis annulipes*. 5, Cylindrical leaf gall of *Liodiplosis cylindrica*. 6, Conical leaf gall of *Liodiplosis conica*. 7, Spherical leaf gall of *Liodiplosis spherica*. 8, Bud gall of *Perasphondylia mikaniae*.

Materials and Methods

Between February, 1996 and October, 1997, monthly collections of galls on *Mikania glomerata* were made in the Reserva Biologica de Poço das Antas, Rio de Janeiro, and between April, 1998 and March, 1999, trimestral collections were made in the following places: Parati, RJ; Parque Nacional do Itatiaia, RJ; Parque Nacional da Serra dos Orgãos, RJ; and Parque Nacional da Tijuca, RJ; and Parque Estadual da Serra do Mar, Ubatuba, SP. On each occasion, all galls were removed from 20–30 individual plants. In the laboratory, galls were separated by kinds, samples of larvae were removed, and the remaining galls placed by type in plastic bags or boxes covered with fine screening to obtain adults. Larvae and reared adults with their pupal exuviae were preserved in 70% ethanol. A large number of hymenopterous parasitoids were also reared. These will be the subject of a separate paper in preparation by two of us (Oda and Monteiro). For microscopic study, specimens were mounted in Canada balsam, using the method outlined in Gagné (1989, 1994). In addition, some pupal exuviae were dried and placed on stubs for scanning electron microscope study. In the description of the new species here, anatomical terminology of the adult stage follows McAlpine et al. (1981) and that of the larval stage follows Gagné (1989). The holotypes and additional specimens of the new species will be deposited in the Museu Nacional do Rio de Janeiro; the remaining specimens and voucher specimens of galls are deposited in the U.S. National Museum of Natural History, Washington, D.C. (USNM). The field work for this study was done by Oda and Monteiro, and the taxonomy and descriptions of the new species were the responsibility of the senior author. The descriptions below appear in alphabetical order by genus.

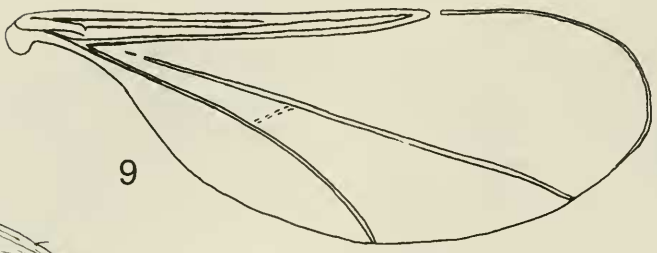
Alycaulus globulus Gagné, new species
(Figs. 9–17)

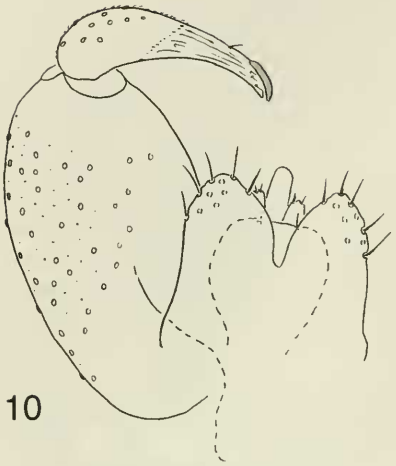
Adult.—*Head:* Antenna (Fig. 12) with 13–16 flagellomeres in ♂ (n = 5), 21–23 in ♀ (n = 5). Mouthparts: labellum semicircular in frontal view, with 6–8 lateral setae; palpus usually 3 segmented, first segment as wide as long, second longer and wider than first, third, when present, narrower, shorter to longer than second.

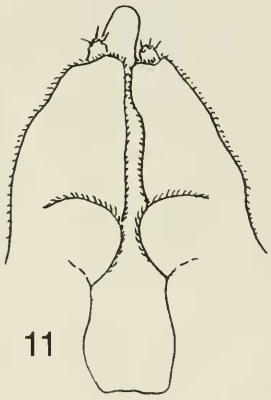
Thorax: Wing (Fig. 9) length, ♂, 1.6–2.1 mm (n = 5); ♀, 2.0–2.4 mm (n = 5); R_5 about 0.66 length of wing. Tarsal claws with strong tooth; empodia as long as claws. Vestiture as follows: scutum with sparse dorsocentral rows of setae and numerous lateral setae, completely covered elsewhere with scales; anepisternum with scales on dorsal half; katepisternum without scales; anepimeron with 21–25 setae and a few scales.

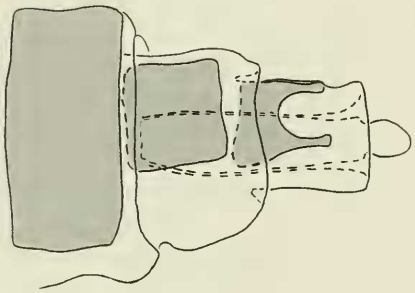
Male abdomen: First through 7th tergites rectangular, about 3 times as wide as long, with single row of setae along posterior margin, a pair of trichoid sensilla on anterior margin, and covered elsewhere with scales except 7th tergite with scales only on posterior third; 8th tergite about as wide as long, weakly sclerotized, the anterior pair of trichoid sensilla the only vestiture. Second through seventh sternites quadrate, with double row of posterior setae, lateral setae, and group of mesal setae, and anterior pair of trichoid sensilla, the remaining area covered with scales. Eighth sternite as for 7th except setae and scales only on posterior half. Genitalia (Figs. 10–11): hypoproct entire, slightly wider than a cercus, with pair of posterior setae; aedeagus longer than hypoproct; claspettes apically with bare protuberance tipped with 2–3 short setae; gonocoxite cylindrical; gonostylus largest at base, tapering abruptly to narrowed apex, setulose basally, carinate beyond.

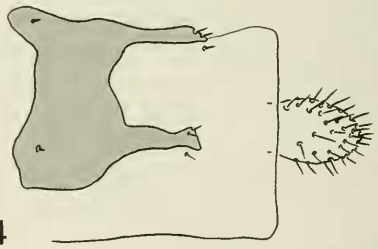
Female abdomen (Figs. 13–14): First through 6th tergites rectangular, about twice as wide as long, with vestiture as in male; 7th tergite only slightly wider than long, with 3 rows of posterior setae, anterior pair of trichoid sensilla, and scales covering only posterior half; eighth tergite unsclerotized posteromesally, resulting posterolateral lobes each with 2–3 short setae, the

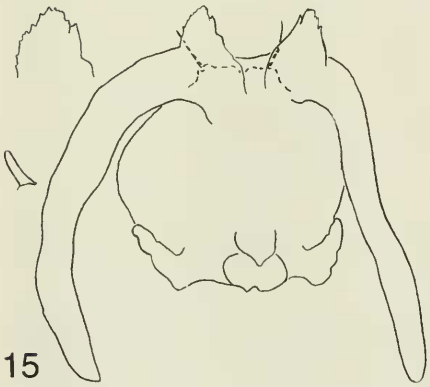


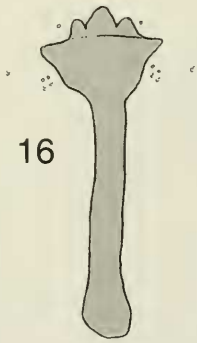


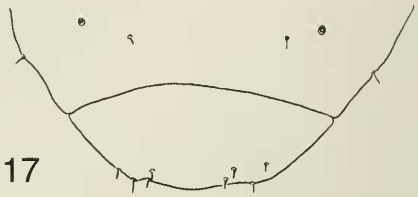












Figs. 9–17. *Alycaulus globulus*. 9, wing. 10, Male genitalia (dorsal). 11, Claspettes and aedeagus. 12, Scape, pedicel, and first 3 flagellomeres. 13, Female postabdomen, from sixth segment to cerci (dorsal). 14, Female eighth tergite to fused cerci. 15, Pupal head with additional drawing of antennal horn in lateral view. 16, Larval spatula and associated papillae. 17, Eighth and terminal larval segments.

only other vestiture the anterior pair of trichoid sensilla. Second to 7th sternites rectangular, the vestiture as for male. Eighth sternite undefined. Ovipositor: eighth segment at midlength with group of lateral setae on each side and scattered ventral setae, with dorsal, longitudinal rows of spicules on posterior third of dorsum enlarged, combined, and modified into retrorse, pointed processes; 9th segment covered on anterior half with many-pointed spicules, on posterior half with scattered setae laterally and ventrally; fused cerci spheroid, evenly covered with setae; hypoproct slightly less than half length of cerci, slightly longer than wide, narrowed and curved apically, with 2 apical setae; protrusible portion of ovipositor about 2.3 times length 7th tergite.

Pupa.—*Head* (Fig. 15): Antennal horns well developed, the anterior margin finely serrate; cervical sclerite with two elongate setae; face without ventral projections, without apparent papillae. Abdominal tergites uniformly spiculose.

Last larval instar.—Integument extensively spiculose dorsally and laterally and on most segments, becoming smoother on last 3 abdominal segments, closely set horizontal rows of spicules present anterventrally on all segments. Spatula (Fig. 16) tridentate anteriorly, middle tooth largest. Papillae: laterals in one group of 4 on each side of spatula, 2 with setae, 2 without; terminal segment (Fig. 17) with 8 setose papillae, the setae of approximately equal length.

Holotype.—Male, from epidermal leaf gall on *Mikania glomerata,* Poço das Antas, RJ, Brazil, VII-1997, Oda, deposited in Museu Nacional do Rio de Janeiro.

Other material examined (all from leaf blister galls on *M. glomerata,* Rio de Janeiro state, Brazil).—2 ♀, same data as holotype; ♂, pupal exuviae, larva, same data as holotype except VIII-1997; 1 ♀, Silva Jardim, Poço das Antas Biological Reserve; ♂, 9 ♀, 5 pupal exuviae, larva, Parque Nacional do Itatiaia, II-1999; 2 ♂, 1 ♀, 2 pupal exuviae, Parque Nacional da Tijuca, XI-1998; 2 ♂, 1 ♀, 4 pupal exuviae, 3 larvae, Parati.

Etymology.—The name *globulus* is an adjective referring to the globular, fused female cerci of this species.

Gall (Fig. 1).—This gall is a slight, thin-walled, ovoid distention of the leaf epidermis. It occurs on either of the leaf surfaces and also on veins and petioles, occasionally directly atop blister galls and vein and petiole swellings made by other species. The single larva pupates in the gall and the pupa emerges from an opening near either end of the gall. The gall was found in each of the collecting localities but in small numbers.

Remarks.—Two other species of *Alycaulus* have been described, both from *Mikania* in the Neotropics. All three have a similarly attenuate gonostylus, a large, three toothed spatula, a long R_5, about ⅔ the length of the wing, the longest known for the Alycaulini, and all are from leaf or petiole galls of *Mikania* spp. *Alycaulus mikaniae* Rübsaamen (1916) was associated with blisters on leaf veins of a *Mikania* sp. in Amazonas, Brazil. The types are in the Museum für Naturkunde der Humboldt Universität in Berlin but are not in a condition to travel through the mail. Fortunately, some fine illustrations accompanied the original description. That of the male genitalia of *A. mikaniae* appear generally similar to the new species except that the gonostylus of *A. mikaniae* looks much more narrow throughout than in *A. globulus.* The larval spatula Rübsaamen drew for *A. mikaniae* is much broader than that of *A. globulus* and has five anterior teeth instead of the three found in *A. globulus.* The fused cercal lobe of the female of the new species is very different from the corresponding structure of *A. mikaniae.* Rübsaamen drew two separate cerci for his species, possibly the main reason he erected *Alycaulus.* The bulbous, single cercal lobe of *A. globulus,* if flattened too much on a slide, folds such that it appears to be two separate cerci. Rübsaamen was an excellent draftsman; nevertheless, Rübsaamen's specimen needs to be seen to determine whether

he drew a crushed fused cercal lobe that only appeared as two cerci.

The second of the two previously described *Alycaulus* species, *Alycaulus trilobatus* Möhn (1964), was described on the basis of larvae taken from petioles of *Mikania micrantha* H.B.K. from El Salvador. Möhn's drawing shows a shorter spatula than that of *A. globulus* but both species have three similar anterior teeth. The ratio of the width of the 3 teeth and length of entire spatula is .27 in *A. trilobatus* but .21 in *A. globulus*. Wünsch (1979) recorded *A. trilobatus* from stem and petiole galls of *Mikania cordifolia* and *Mikania* sp. from Colombia. He redescribed a larva similar to that in Möhn's drawing and described also the pupa and female for the first time. Wünsch drew the cerci as fused, as it is in *A. globulus*. The pupal antennal horns of *A. trilobatus* are broader and more serrate than in *A. globulus*.

Asphondylia glomeratae Gagné, new species

(Figs. 18–22, 28–29)

Adult.—*Head:* Antenna (Fig. 18) with scape slightly more than twice length pedicel; pedicel about as wide as long; first flagellomere less than twice length of scape; proportions of female segments and flagellomeres as in Fig. 18. Eye facets hexagonal, closely approximated. Frons with 18–20 setae. Clypeus asetose dorsally, with several short setae laterally, and setulose ventrally. Hypopharynx closely lined with setulae dorsoapically. Labella setose and setulose laterally, with small area of setulae and 0–1 setae mesally. Palpus 3 segmented, first segment about as long as wide, second segment about twice as long as wide, third narrower than second, about 3 times as long as wide, all covered with setulae and setae.

Thorax: Wing length, male, 2.0–2.3 (n = 4), female, 2.8–2.9 (n = 2). Dorsocentral setal row at midlength with two rows of setae intermixed with scales, the row continuing onto scutellum to posterior margin. Scutellum bare between dorsocentral rows of setae, with setae posteriorly laterad of dorsocentral rows, and otherwise with sparse scales laterally. Anepisternum with setae and scales on dorsal half. Anepimeron covered with setae. Katepimeron bare. Tarsal claws (Fig. 20) all equal in size and shape, as long as empodia.

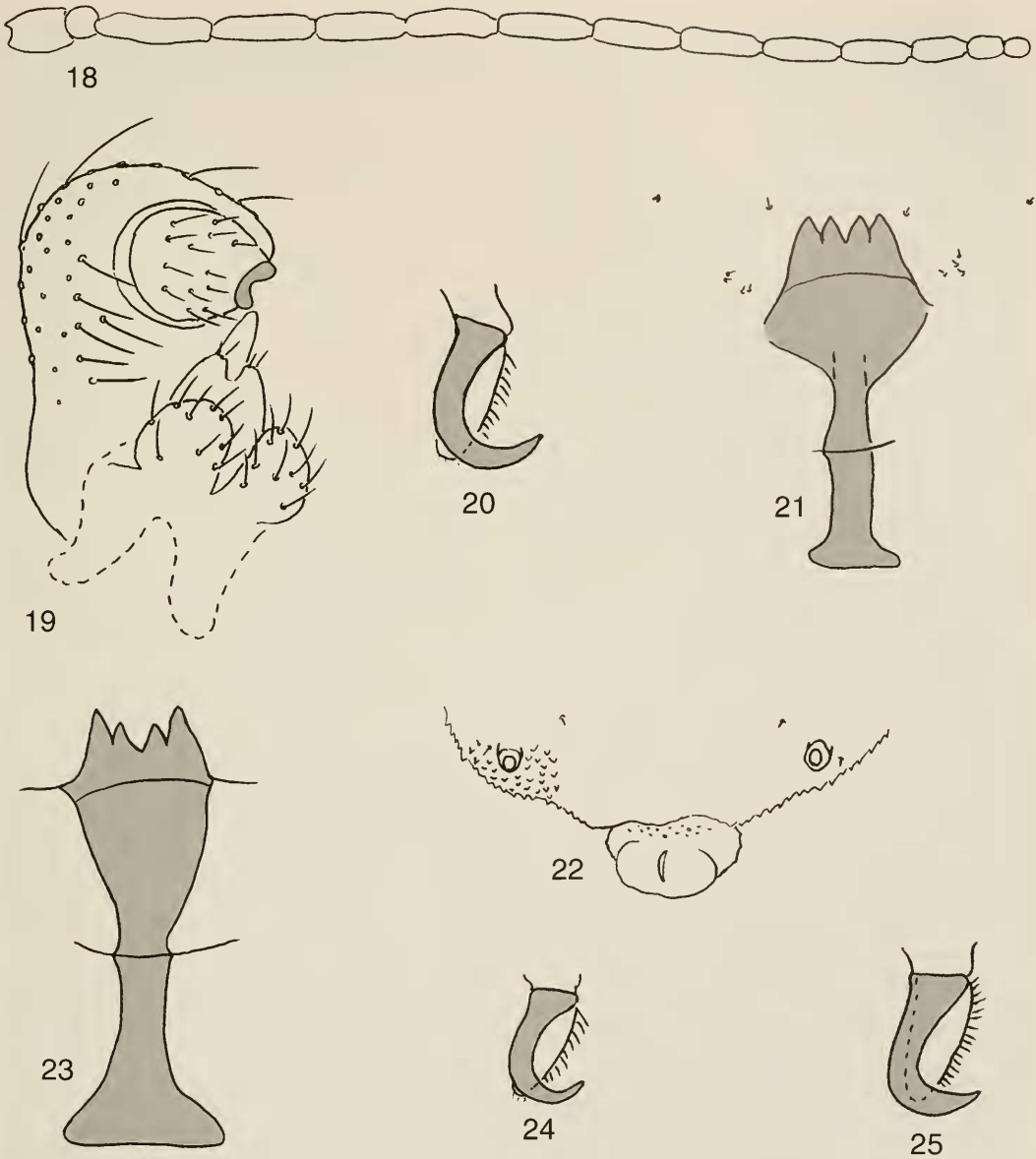
Abdomen: Tergites without anterior pair of trichoid sensilla, first through seventh tergites rectangular with mostly single row of posterior setae (sparser in male than in female), mostly double row on seventh tergite, several lateral setae, elsewhere covered with scales, width of sixth and seventh tergites about 2 ½ times length; eighth tergite short, bandlike, without vestiture. Sternites without anterior pair of trichoid sensilla, width sixth sternite about twice length, male eighth sternite reduced in size, as wide as long. Male genitalia as in Fig. 19. Distal half of ovipositor approximately .55 length seventh sternite.

Pupa (Figs. 28–29).—Antennal horns conical, elongate, evenly tapered from base to pointed apex. Upper frontal horn elongate-conical with single apex. Lower frontal horn 3-toothed, the middle tooth about twice length of lateral teeth. Abdominal tergites 2–8 each with, from posterior margin, a regular horizontal row of stout spines, a short bare space, two irregular, sparser rows of stout spines followed by scattered, much smaller spines towards anterior margin of sclerite.

Third larval instar.—Spatula (Fig. 21) robust, elongate, 4-toothed anteriorly, the 4 teeth of similar length. Sternal, the 4 pairs of lateral, and the pair of ventral papillae are with setae. One pair of terminal papillae only barely distinguishable from spicules (Fig. 22).

Holotype.—Male, from vein blister gall on *Mikania glomerata,* Rio de Janeiro, RJ, 6-VII-1996, Oda & Monteiro, deposited in Museu Nacional do Rio de Janeiro.

Other material examined (all from vein or petiole blister galls on *M. glomerata,* Rio de Janeiro state, Brazil).—1 ♂, same data as holotype; 1 ♂, 2 ♀, 3 pupal exuviae,



Figs. 18–25. 18–22, *Asphondylia glomeratae*. 18, Silhouette of female antenna. 19, Male genitalia. 20, Foretarsal claw and empodium. 21, Larval spatula and associated papillae. 22, Eighth and terminal larval segments. 23–25, *Asphondylia moehni*. 23, Larval spatula. 24, Foretarsal claw and empodium. 25, Midtarsal claw and empodium.

Silva Jardim, Poço das Antas Biological Reserve, IX-1997; larva, Silva Jardim, Poço das Antas Biological Reserve, IX-1999; 3 larvae, Teresópolis, VIII-1999; 2 ♂, pupa, Parati.

Etymology.—The specific name *glomeratae* is the genitive of the host plant specific name.

Gall (Fig. 2).—This gall is a single-celled, thin-walled, green, slight swelling of the leaf veins on either leaf surface and on petioles. It can be readily distinguished

from two externally similar galls, the swollen vein and simple epidermal galls, by the presence of fungal mycelium lining the inside of the larval chamber of *A. glomeratae.* The single larva pupates in the gall and the pupa emerges from an opening near either end of the gall. The gall was uncommon but found in each of the collecting localities.

Remarks.—*Asphondylia glomeratae* is distinct from *A. moehni* in having identically shaped tarsal claws, three distinct teeth on the pupal lower frontal horn, and a larval spatula with four uniformly long anterior teeth.

Asphondylia ulei Rübsaamen (1907) also forms a leaf gall on *Mikania.* It was described from a larva and pupa taken from 5 mm long, hairy, spherical galls on the underside of leaves of an undetermined species of *Mikania* in Palmeiras, Rio de Janeiro, Brazil. Galls of *A. glomeratae* are smooth, not hairy, and a redescription of the type series of *A. ulei* in Möhn (1973) shows a pupa with only one lower frontal horn, not three as in *A. glomeratae,* and a larval spatula with uneven anterior teeth, not of similar size and shape as in *A. glomeratae.*

Asphondylia moehni Skuhravá
(Figs. 23–27)

tavaresi Möhn 1973: 4, *Asphondylia.* Secondary junior homonym of *Asphondylia tavaresi* Rübsaamen 1916.

moehni Skuhravá 1989: 203, *Asphondylia.* New name for *Asphondylia tavaresi* Möhn.

Adult (female only).—*Head:* Antenna (as for *A. glomeratae,* Fig. 18) with scape slightly more than twice length pedicel; pedicel about as wide as long; first flagellomere almost twice length of scape. Eye facets hexagonal, closely approximated. Frons with approximately 36–40 setae. Clypeus asetose dorsally, with several short setae laterally, and setulose ventrally. Hypopharynx closely lined with setulae dorsally. Labella setose and setulose laterally and ventrally. Palpus 3 segmented, first segment about as long as wide, second segment about twice as long as wide, third narrower than second, about 3 times as long as wide, all covered with setulae and setae.

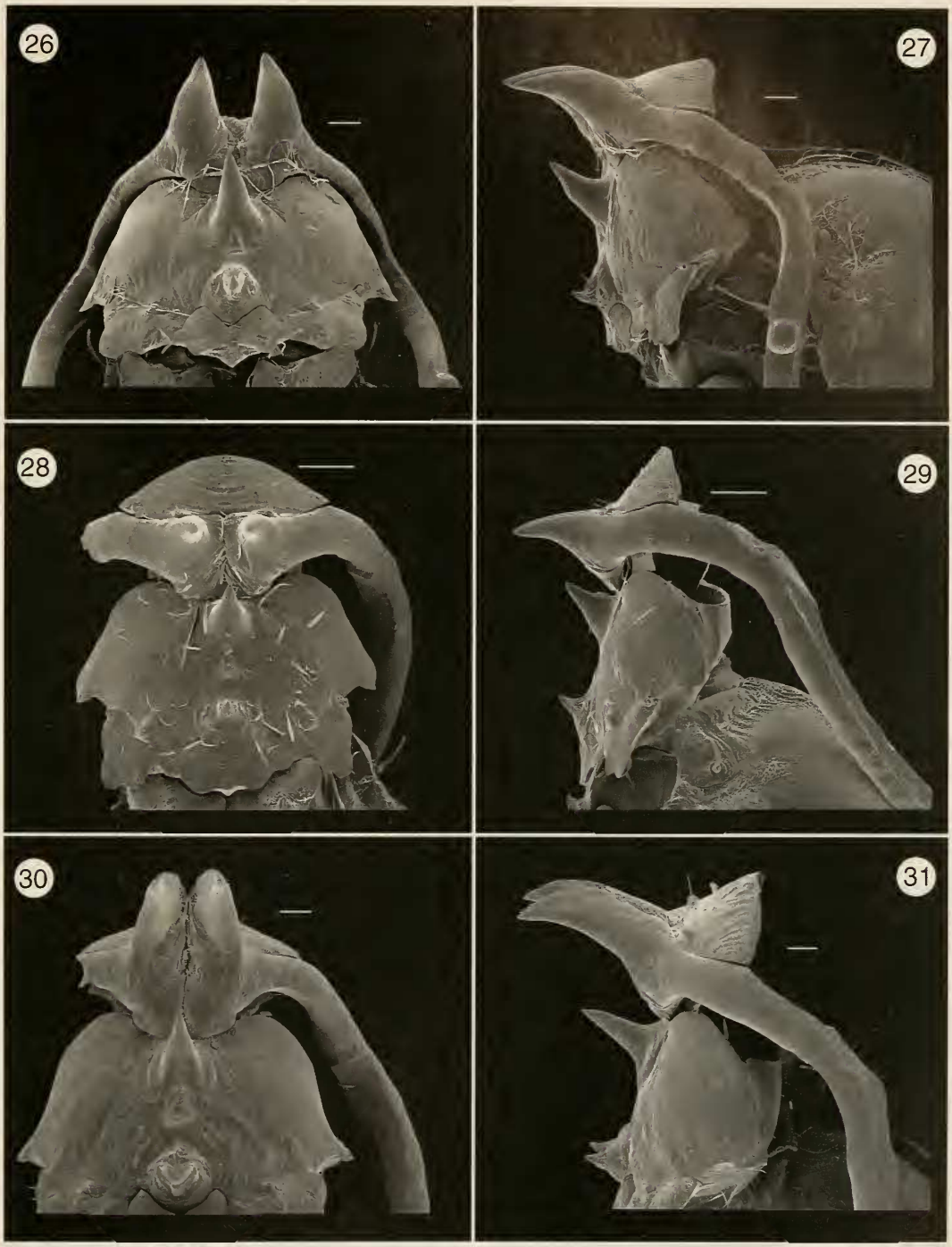
Thorax: Wing length, 3.4–3.6 (n = 5). Dorsocentral setal row at midlength with three rows of setae intermixed with several scales, the row continuing onto scutellum to posterior margin. Scutellum bare between dorsocentral rows of setae, with setae posteriorly laterad of dorsocentral rows, and otherwise with sparse scales laterally. Anepisternum with setae and scales on dorsal third. Anepimeron covered with setae. Katepimeron bare. Tarsal claws (Figs. 24–25) larger on mid- and hindleg than on foreleg, as long as empodia.

Abdomen: Tergites without anterior pair of trichoid sensilla, first through seventh tergites rectangular with mostly single row of posterior setae, mostly double row on seventh tergite, many lateral setae, elsewhere covered with scales, width of sixth and seventh tergites about 2 ½ times length; eighth tergite short, bandlike, without vestiture. Sternites without anterior pair of trichoid sensilla, width sixth sternite about twice length. Distal half of ovipositor approximately .55 length seventh sternite.

Pupa (Figs. 26–27).—Antennal horns conical, elongate, evenly tapered from base to pointed apex. Upper frontal horn elongate-conical with single apex. Lower frontal horn 3-toothed, the middle tooth much larger than lateral teeth, which are litle more than slightly convex carinae. Abdominal tergites 2–8 each with, from posterior margin, a regular horizontal row of stout spines, a short bare space, two irregular, sparser rows of stout spines followed by scattered, much smaller spines towards anterior margin of sclerite.

Third larval instar (only spatula available, from cast exuviae).—Spatula (Fig. 23) robust, elongate, 4-toothed anterioly, the two middle teeth appreciably shorter than the lateral teeth.

Holotype.—Male, from stem gall on *Mi-*



Figs. 26–31. Pupal exuviae, anterior segments. 26, *Asphondylia moehni,* ventral view. 27, Same, lateral. 28, *Asphondylia glomeratae,* ventral. 29, Same, lateral. 30, *Perasphondylia mikaniae,* ventral. 31, Same, lateral. Line = 100 μm.

kania guaco Humb. & Bonpl., São Leopoldo, Rio Grande do Sul, Brazil, in the Tavares Collection, at present in the Staatliches Museum für Naturkunde, Stuttgart, Germany.

Other material examined (all from stem galls on *M. glomerata,* Rio de Janeiro state, Brazil).—Parati, II-1999, 2 larvae; Parati, VII-1999, 3 larvae; Parque Nacional da Serra dos Orgãos, II-1999, 5 ♀, 3 pupa, 6 pupal exuviae; Picinguaba, 4 ♀, 3 pupal exuviae.

Gall (Fig. 3).—This species causes a ridged, spongy-textured, stem swelling found usually to one side of but sometimes surrounding the leaf petiole or stem. It commonly is found with a single larval cell, but may occur in aggregate and have several cells. At first the galls are green but eventually turn a yellow-brown. The interior of the larval cells is lined with a fungal mycelium. The single larva in each chamber pupates in the gall and the pupa emerges from an opening that may occur anywhere on the surface. This gall was found in most of the collection localities but was never common.

Remarks.—Tavares (1909) published a photo showing a similar gall to that on *M. glomerata* but on *Mikania guaco* Humb. & Bonpl. from São Leopoldo, Rio Grande do Sul, Brazil. Specimens that Tavares reared from that gall were later described and named *Asphondylia tavaresi* by Möhn (1973). The specimens consisted of a male, a partial pupa with head and thorax lacking, and a larva. We were not able to rear a male to compare with Möhn's illustrations and the pupal abdomen is not specific enough for comparison with the species reared from *M. glomerata,* but the larval spatula as drawn by Möhn fits that of our specimens. For the present we consider our specimens to be the same as Möhn's species, now known as *A. moehni* Skuhravá.

Asphondylia moehni is distinct from *A. glomeratae* in having smaller foretarsal than mid- and hindtarsal claws, one distinct tooth on the pupal lower frontal horn, and a larval spatula with uneven anterior teeth.

Contarinia ubiquita Gagné, new species
(Figs. 32–34)

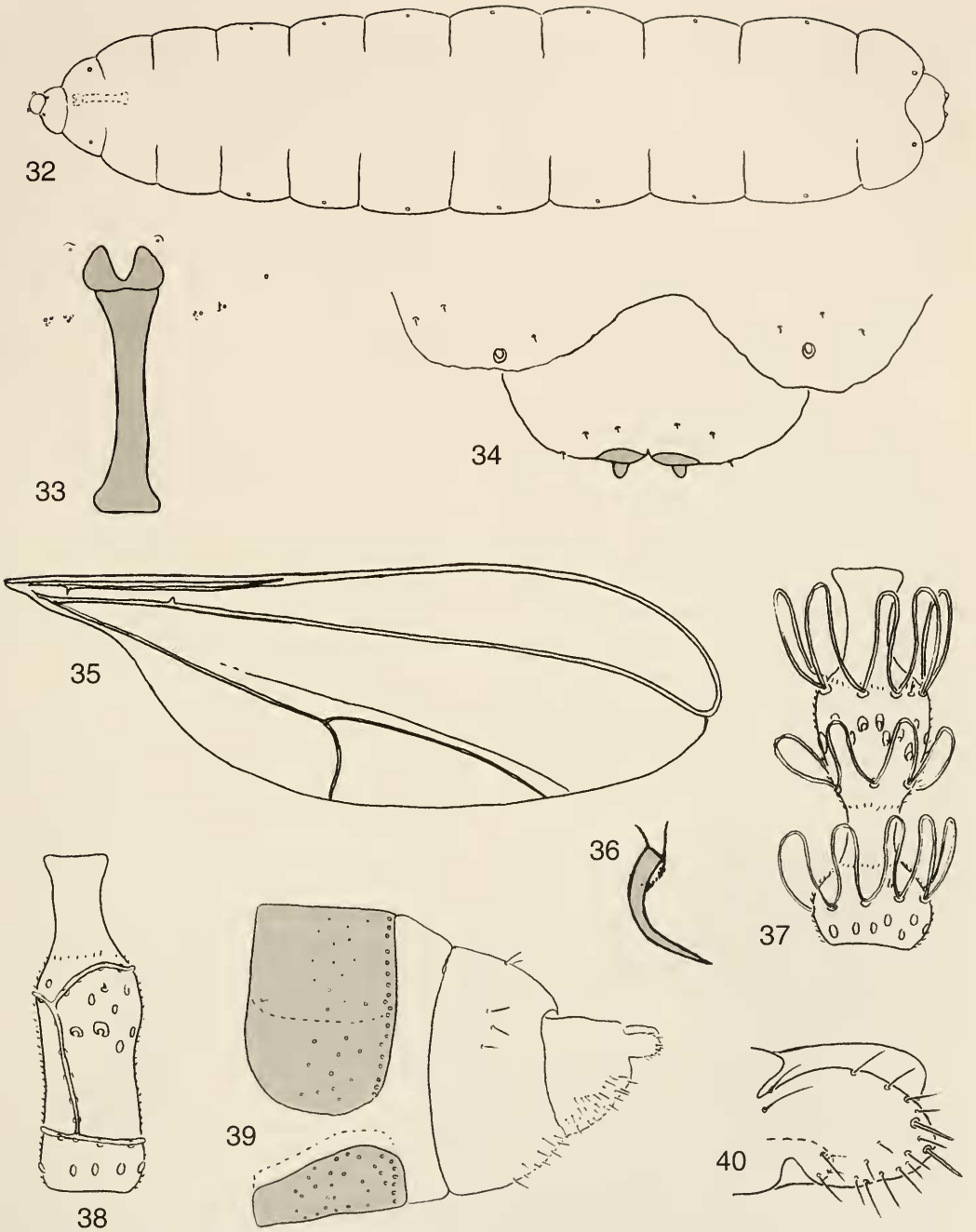
Larva (Figs. 32–34), third instar (only stage known).—White. Integument smooth except for anteroventral, horizontal rows of tiny spicules on venter of second and third thoracic and all abdominal segments. Spatula (Fig. 33) bidentate anteriorly. Papillar setae short, barely longer than width of papillar bases. Terminal pair of corniform papillae (Fig. 34) dark and pigmented extensively beyond bases.

Holotype.—Larva, from bud gall of *Perasphondylia mikaniae* on *Mikania glomerata,* Silva Jardim, Poço das Antas Biological Reserve, RJ, XI-1997, Oda, deposited in Museu Nacional do Rio de Janeiro.

Other material examined.—All from *M. glomerata,* Rio de Janeiro state, Brazil: 2 larvae, same data as holotype; 20 larvae from stem gall of *Asphondylia glomeratae,* Parque Nacional da Serra dos Orgãos, II-1999; 2 larvae from unspecified *Liodiplosis* leaf gall, Silva Jardim, Poço das Antas Biological Reserve, VII-1997; 9 larvae from petiole gall of *Mikaniadiplosis annulipes,* Parati, VII-1999; 6 larvae from epidermal gall of *Alycaulus globulus,* Parati, VII-1999.

Etymology.—The name *ubiquita* is an adjective meaning ubiquitous that refers to the fact that this species occurs as an inquiline in five of the eight known galls of *Mikania glomerata.*

Remarks.—This species is known only from larvae. These drop to the ground when full grown, unlike the *Mikania* gall makers, which all pupate in their galls. *Contarinia ubiquita* larvae were discovered in the course of this work from bud galls of *Perasphondylia mikaniae,* epidermal galls of *Alycaulus globulus,* a stem gall of *Asphondylia glomeratae,* petiole galls of *Mikaniadiplosis annulipes,* and an unspecified *Liodiplosis* leaf gall. The larvae are gregarious and, in the case of the petiole gall, fill



Figs. 32–40. 32–34, *Contarinia ubiquita* larva. 32, Whole larva, dorsal view. 33, Spatula. 34, Eighth and terminal segments, dorsal. 35–40, *Liodiplosis cylindrica*. 35, Wing. 36, Tarsal claw and empodium. 37, Male third flagellomere. 38, Female third flagellomere. 39, Female postabdomen, seventh segment to cerci (dorsolateral). 40, Female cerci and hypoproct, detail (lateral).

the gall cavity. Despite having only larvae of this species, it is named here because it appears in many galls, and it is handy to have a name for further work that will be done with *Mikania* galls. It differs from other known *Contarinia* species in the pigmented area that can be seen surrounding the base of the pair of corniform papillae of the terminal segment (Fig. 34). Larvae of all other known *Contarinia* species have only the papillae themselves pigmented and not the surrounding area.

Liodiplosis Gagné, new genus

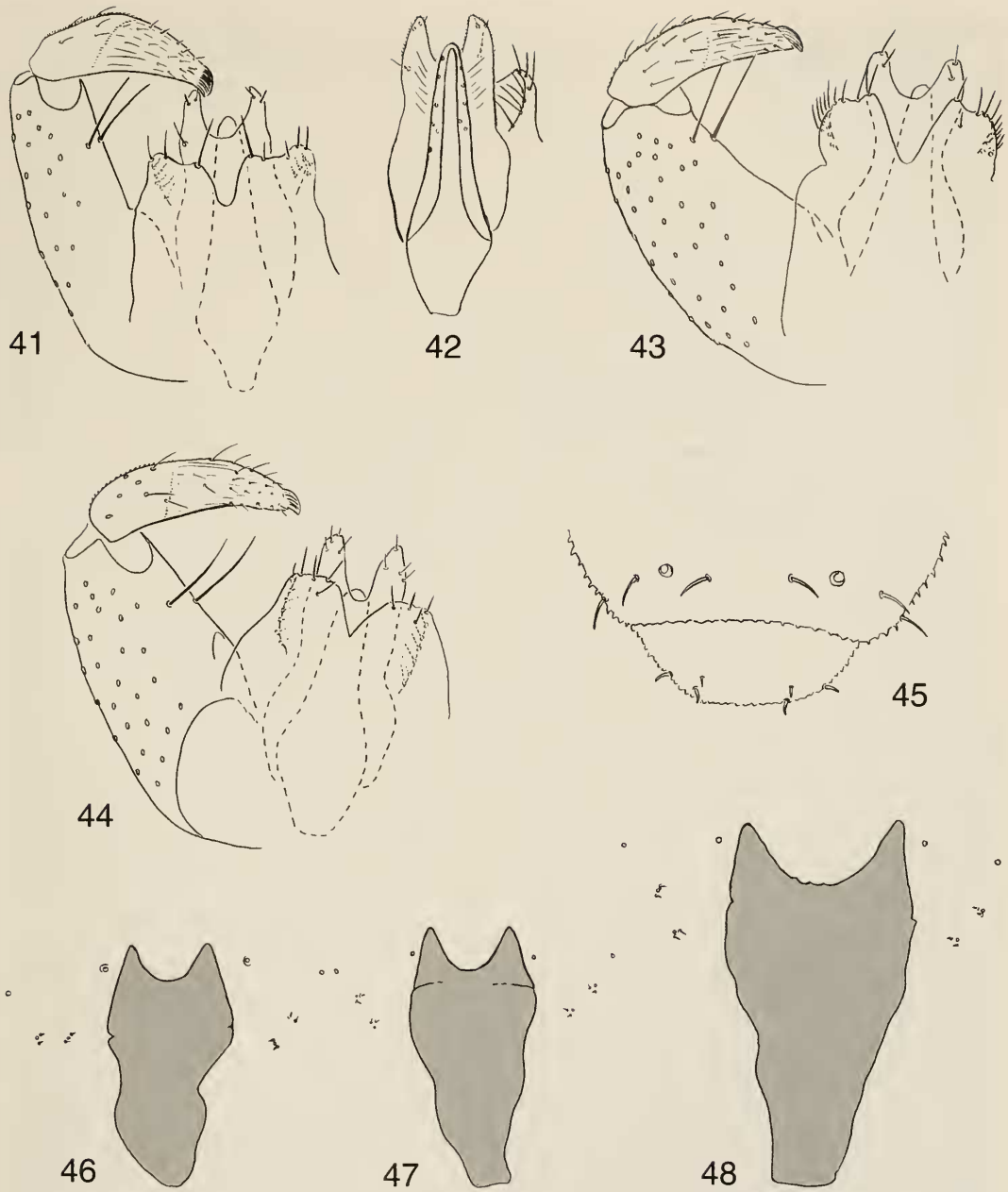
Adult.—*Head:* Eyes connate, 11–12 facets long at vertex; facets mostly hexagonoid, all closely adjacent. Occiput with dorsal protuberance with 2 apical setae. Frons with setae. Labella ellipsoid and pointed apically, each with several lateral setae. Palpus 4-segmented. Male antennal flagellomeres (Fig. 37) binodal; one circumfilum on basal node, two on distal node, loops of the three circumfila subequal in length. Female flagellomeres (Fig. 38) cylindrical, ringed by two appressed circumfila connected by two longitudinal bands and with long necks.

Thorax: Wing (Fig. 35) unmarked, R_5 curved apically, joining C posterior to wing apex; Rs incomplete, closer to arculus than to apex of R_1. Tarsal claws (Fig. 36) untoothed, curved near middle; empodia very short, not attaining bend in claws; pulvilli as long as empodia.

Male abdomen: First through sixth tergites entire, rectangular, with single posterior row of setae, several lateral setae, scattered scales, and 2 anterior trichoid sensilla; seventh tergite weakly sclerotized posteriorly, with few to several posterolateral setae on each side, several anteromesal scales, and anterior pair of trichoid sensilla; eighth tergite weakly sclerotized anteriorly, the only vestiture the anterior pair of trichoid sensilla. First through eighth sternites rectangular, covered with setae and with 2 anterior trichoid sensilla; eighth sternite similar to preceding except longer. Genitalia (Figs. 41–44): cerci rectangular with a few posterior and several lateral setae, lateral margin strongly curved ventrad; hypoproct appreciably longer than cerci, widest basally, narrowing near midlength and deeply divided apically, resulting lobes tapering to narrow apices and with a few setae apically, dorsal surface setulose, ventral surface bare and horizontally banded; aedeagus shorter than hypoproct, tapering gradually from base to narrowly rounded apex, with longitudinal rows of sensory pits; gonocoxite cylindrical with slight, obtuse, mesobasal lobe; gonostylus broadest near midlength, tapering beyond, with setulae on basal half, covered beyond with minute carinae and scattered short setae.

Female abdomen: First through seventh tergites entire, rectangular, with mostly single row of posterior setae, several lateral setae, extensively covered with scales, and with 2 anterior trichoid sensilla. Eighth tergite unsclerotized, with several posterior setae and anterior pair of trichoid sensilla. Second through seventh sternites quadrate, extensively covered with setae and scales and with anterior pair of trichoid sensilla. Ovipositor (Figs. 39–40) only slightly protrusible, venter of eighth segment with setae on posterior surface, dorsum of ninth and tenth segments without vestiture, venter of ninth and tenth segments with setae, cerci ovoid, with pair of apical sensory setae and scattered setae elsewhere, hypoproct short, broad, with 2 posterior setae.

Pupa (Figs. 49–58).—*Head:* Antennal horns widely separated, each tapering to single apical point, the apex projecting ventroapically; cervical sclerite with papillae situated on two prominences, each with short seta; face without ventral projections, with usually 3, occasionally fewer papillae, on each side of base of labrum, and with group of three papillae near base of palpus. Prothoracic spiracle elongate. Abdominal second through eighth tergites (Fig. 58) anteriorly with mostly double row of pigmented spines, tergal surface covered elsewhere with uniformly small spicules, ex-



Figs. 41–48. *Liodiplosis* spp. 41, *Liodiplosis cylindrica,* male genitalia (dorsal view). 42, Same, aedeagus, hypoproct and a cercus (ventral). 43, *Liodiplosis conica,* male genitalia (dorsal). 44, *Liodiplosis spherica,* male genitalia (dorsal). 45, *Liodiplosis cylindrica,* eighth and terminal larval segments (dorsal). 46, Same, spatula and associated papillae. 47, *Liodiplosis conica,* spatula and associated papillae. 48, *Liodiplosis spherica,* spatula and associated papillae.

cept for bare horizontal band posteriad of dorsal papillae.

Third larval instar.—White. Integument mostly covered with large spicules that spread apart as larva grows. Antenna about twice as long as wide. Spatula (Figs. 46–48) with 2 widely separated anterior teeth, the space between occasionally weakly

toothed; shaft reduced posteriorly. Lateral thoracic papillae in 2 groups of usually 3 on each side of central line, 2 papillae in each group with tiny seta. Dorsal and pleural papillae with elongate setae. Terminal segment (Fig. 45) rounded, with only 6 papillae, each with elongate seta, those of one pair slightly longer than remainder.

Type species.—*Liodiplosis cylindrica* Gagné.

Etymology.—The name *Liodiplosis* is a combination of the Greek word "leio" (shortened here to lio) meaning smooth, and "diplosis," a suffix commonly used for genera of the supertribe Cecidomyiidi. The prefix refers to the smooth venter of the male hypoproct, although that character is not exclusive to this genus. The suffix means "double," in reference to the two-noded male flagellomeres. The generic name is feminine.

Remarks.—The new genus belongs to the tribe Clinodiplosini and will key to *Clinodiplosis* in couplet 56 of Gagné (1994). The unique characters of the tribe Clinodiplosini are the obtuse mesobasal lobe of the gonocoxite, the usually quadrate, sometimes secondarily bilobed, male cerci, and a particular conformation of the larval terminal papillae in which two pairs of the four pairs are corniform, the other two pairs setiform, the more lateral of the two pairs of setae longer than the more mesal pair (cf. Gagné 1989, 1994). The male genitalic characters of *Liodiplosis* conform to the tribal expectation but the larval characters do not. In the new genus, the larval terminal papillae number only six, all of them setiform, the most lateral pair of setae slightly longer than the other two pairs that are subequal in length. A seventh, small, setiform papilla occurs on one specimen of one species, *Liodiplosis spherica*. The usual presence of only six papillae indicates a loss, of course, but the fact that none is corniform indicates either that a pair of corniform papillae reverted to setiform or that this new genus shows a character state that is primitive to that found in all other Clinodiplosini.

Unusual also for clinodiplosines is the modified larval spatula, evidently an adaptation for life in the particular galls. Clinodiplosini usually have a clove shaped spatula, two rounded apical lobes at the end of a long shaft, its length more than 3.5 times as long as widest part just behind the anterior lobes. In *Liodiplosis* the spatula is more robust, wider than the larval head but only about twice as long as wide.

The large spines on the second to eighth abdominal terga of the pupa of *Liodiplosis* appear only in some, not all, Neotropical Clinodiplosini that pupate in their galls. Other Clinodiplosini with such spines are *Clinodiplosis eupatorii* Felt, *Houardodiplosis rochae* Tavares, *Iatrophobia braziliensis* Rübsaamen, and *Schismatodiplosis lantanae* Rübsaamen. The spines are an adaptation that allows the pupa to gain purchase on the interior surface of the gall while breaking out of the gall.

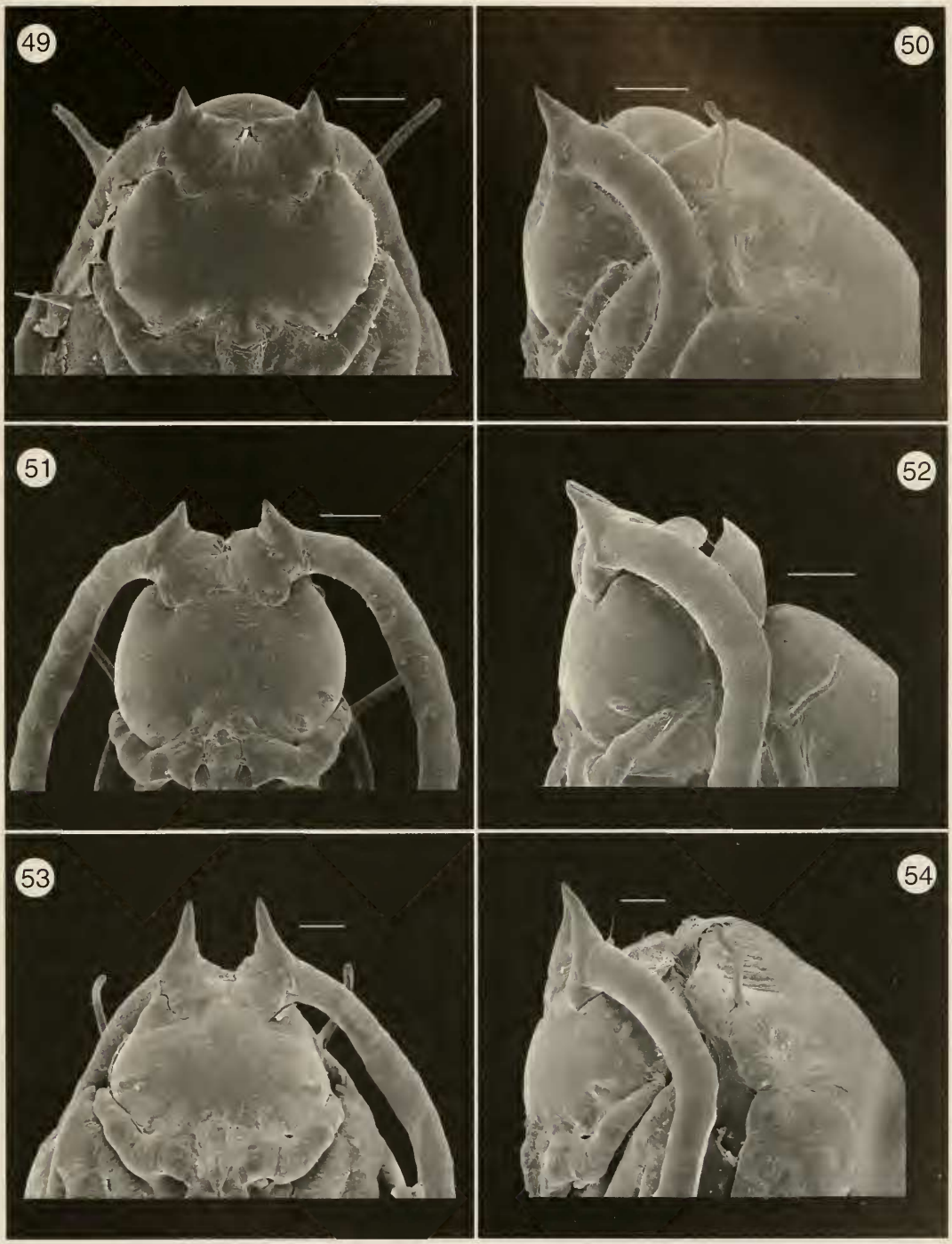
A pupal abdominal character (Fig. 58) brought to light here may be peculiar to the tribe Clinodiplosini because it occurs also in other genera of that tribe for which RJG has seen pupae. It is a horizontal band posteriad of the dorsal papillae that, unlike the remainder of the spinulose and spiny terga, is smooth, although somewhat crumpled and obscured in some dry specimens. This character does not occur in other tribes, e.g., Lopesiini, and may possibly be unique to Clinodiplosini.

Three new species are described below from three distinct leaf galls on *Mikania glomerata* (Figs. 5–7). The species are quite similar. They differ in the shape of the male genitalia and characteristics of the pupal head.

Liodiplosis cylindrica Gagné, new species

(Figs. 35–42, 45–46, 49–50, 55)

Adult.—*Head:* Male third antennal flagellomere as in Fig. 37. Female third flagellomere as in Fig. 38.



Figs. 49–54. Pupal exuviae, anterior segments. 49, *Liodiplosis cylindrica,* ventral view. 50, Same, lateral. 51, *Liodiplosis conica,* ventral. 52, Same, lateral. 53, *Liodiplosis spherica,* ventral. 54, Same, lateral. Line = 100 μm.

Thorax: Wing length, male 2.2 mm (n = 3), female 2.5–2.9 mm (n = 5). Tarsal claws as in Fig. 36.

Male abdomen: Genitalia (Figs. 41–42): gonocoxite narrow, elongate-cylindrical.

Female postabdomen: As in Figs. 39–40.

Pupa.—*Head* (Figs. 49–50, 55): Antennal horns pointed, the apex projecting ventroanteriorly. Cervical sclerite smooth, without spicules, cervical papillae on two lateral bumps each with one or two short setae, with no other bumps present. Notum with anterior surface smooth.

Third larval instar.—Spatula and associated papillae as in Fig. 46. Eighth and terminal abdominal segment as in Fig. 45.

Holotype.—Male, from cylindrical galls on *M. glomerata,* Silva Jardim, Poço das Antas Biological Reserve, RJ, Brazil, from cylindrical gall on *M. glomerata,* Oda & Monteiro, deposited in Museu Nacional do Rio de Janeiro.

Other material examined (all from cylindrical galls on *M. glomerata,* Rio de Janeiro state, Brazil).—2 ♂, 2 ♀, 6 pupal exuviae, 3 larvae, same data as holotype; 3 ♀, 3 pupal exuviae, 2 larvae, Rio de Janeiro, 6-XII-1996; pupa, Rio de Janeiro, 7-I-1996; 1 ♂, 3 ♀, 3 pupal exuviae, Parati.

Etymology.—The specific name *cylindrica* is an adjective that refers to the shape of the gall made by this species.

Gall (Fig. 5).—This is a single-celled, thin-walled but rigid, elongate, unevenly cylindrical gall, generally widest at about midlength and tapered apically. It occurs on either surface of the leaf blade and less commonly on the petioles and young branches. The gall is light green when young, later turning red basally and dark green apically. The single larva pupates in the gall and the pupa emerges from an operculum near the gall apex. The gall was fairly abundant and the most commonly encountered in each of the regular collection localities.

Remarks.—The female and larva of this species are similar to those of the other two species. The male gonocoxite (Fig. 41) is distinct in being much narrower than in *L. conica* and *L. spherica.* The pupa of *L. cylindrica* is generally similar to that of *L. conica,* but the latter has a slight mesal prominence on the cervical sclerite. Neither of these two species has spiculae on the cervical sclerite and notum, nor two large posterior bumps on the cervical sclerite as does *L. spherica.*

Liodiplosis conica Gagné, new species
(Figs. 43, 47, 51–52, 56)

Adult.—*Head:* Male and female third antennal flagellomeres as for *L. cylindrica* (Figs. 37–38).

Thorax: Wing length, male 2.4–2.6 mm (n = 2), female 2.9 mm (n = 2).

Male abdomen: Genitalia (Fig. 43): gonocoxite elongate-cylindrical.

Female abdomen: As for *L. cylindrica* (Figs. 39–40).

Pupa.—*Head* (Figs. 51–52, 56): Antennal horns pointed, the apex projecting ventroanteriorly. Cervical sclerite smooth, without spicules, cervical papillae on two lateral bumps each with one or two short setae, and with a slight mesal prominence. Notum with anterior surface smooth.

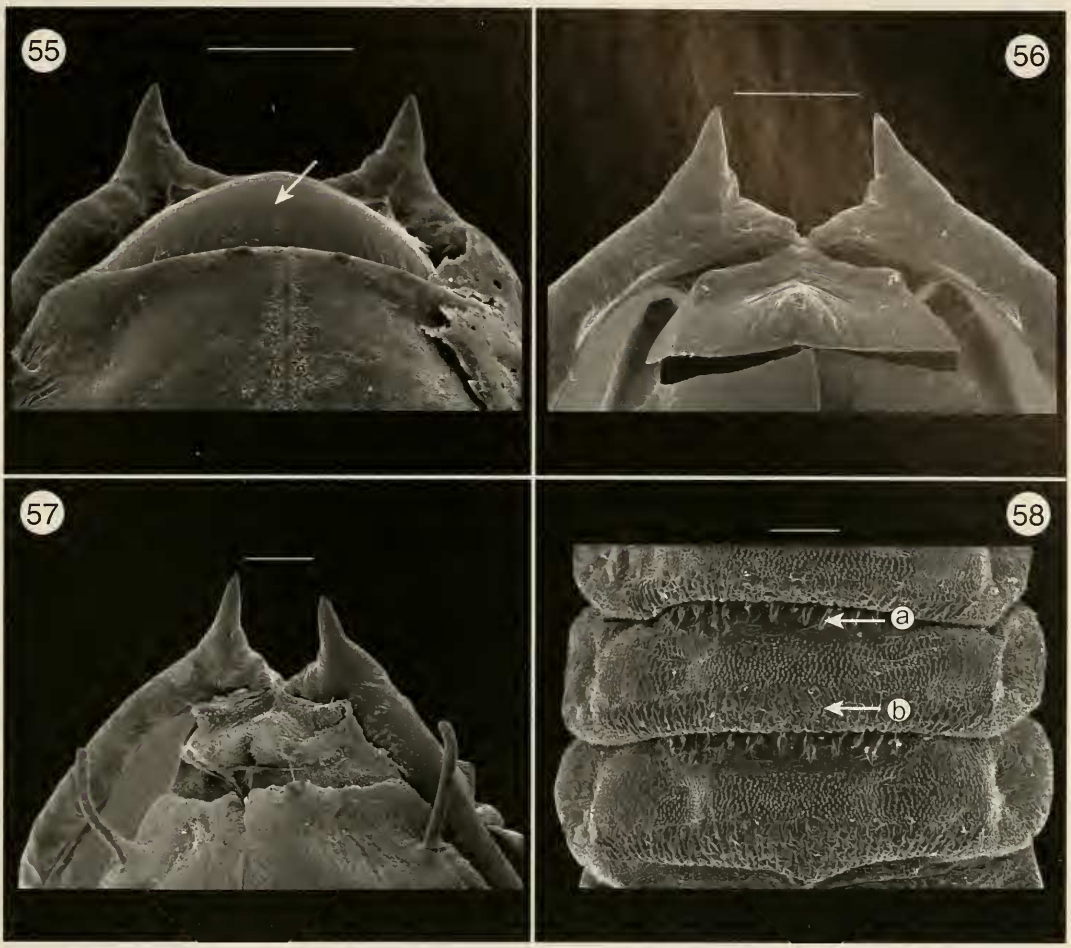
Third larval instar.—Spatula as in Fig. 47.

Holotype.—Male, from conical gall on *Mikania glomerata,* Parque Nacional da Tijuca, RJ, Brazil, II-1999, deposited in Museu Nacional do Rio de Janeiro.

Other material examined (all from conical galls on *M. glomerata,* Rio de Janeiro state, Brazil).—4 ♀, 5 pupal exuviae, same data as holotype; 2 larvae, XI-1998, otherwise same data as holotype; 2 ♂, 2 ♀, 2 pupal exuviae, 2 larvae, Silva Jardim, Poço das Antas Biological Reserve, Oda & Monteiro.

Etymology.—The specific name *conica* is an adjective that refers to the shape of the gall made by this species.

Gall (Fig. 6).—This is a single-celled, thin-walled, conical, light green, rigid gall found on either surface of the leaf blade and



Figs. 55–58. Pupal exuviae. 55, *Liodiplosis cylindrica,* anterior segments (dorsal; arrow denotes cervical sclerite). 56, *Liodiplosis conica,* anterior segments. 57, *Liodiplosis spherica,* anterior segments. 58, Same, third through fifth tergites ("a" denotes row of spines and "b" the smooth area, now shrivelled, just ventrad of the dorsal row of papillae. Line = 100 μm.

also on the petioles and young branches. The single larva pupates in the gall and the pupa emerges from an operculum near the gall apex. The gall was uncommon, found in only three of the six regular collection sites, and always in heavy shade.

Remarks.—See under *L. cylindrica* for specific differences among the three species of *Liodiplosis.*

Liodiplosis spherica Gagné, new species

(Figs. 44, 48, 53–54, 57–58)

Adult.—*Head:* Male and female third antennal flagellomeres as for *L. cylindrica* (Figs. 37–38).

Thorax: Wing length, male 2.8 mm (n = 2), female 3.0–3.7 mm (n = 2).

Male abdomen: Genitalia (Fig. 44): gonocoxite elongate-cylindrical.

Female abdomen: As for *L. cylindrica* (Figs. 39–40).

Pupa.—*Head* (Figs. 53–54, 57): Antennal horns pointed, the apex projecting ventroanteriorly. Cervical sclerite spiculose, cervical papillae on two lateral bumps each with one or two short setae, and with two large posterior prominences. Notum anterior surface spiculose.

Third larval instar.—Spatula as in Fig. 47.

Holotype.—Male, from spherical gall on *Mikania glomerata,* Parati, RJ, Brazil, deposited in Museu Nacional do Rio de Janeiro.

Other material examined (all from spherical galls on *M. glomerata,* Rio de Janeiro state, Brazil).—2 ♀, 2 pupal exuviae, same data as holotype; 1 ♂, 3 ♀, 2 pupal exuviae, 2 larvae, Silva Jardim, Poço das Antas Biological Reserve; 2 ♀, same data as preceding except VII-1997; 3 ♀, 3 pupal exuviae, 3 larvae, Rio de Janeiro, 6-XII-1996.

Etymology.—The specific name *spherica* is an adjective that refers to the shape of the gall made by this species.

Gall (Fig. 7).—The gall of *L. spherica* is spherical, single-celled, and has thick, spongy walls. It protrudes evenly from both sides of the leaves, petioles, and young branches. It is sometimes found in large aggregations. Its green color is similar to that of the leaves. The single larva pupates in the gall and the pupa emerges from an operculum near either of its two apices. The gall was fairly abundant and found in all six of the regular collection sites.

Remarks.—See under *L. cylindrica* for specific differences among the three species of *Liodiplosis.*

Mikaniadiplosis Gagné, new genus

Adult.—*Head:* Eyes connate, 10–11 facets long at vertex; facets mostly hexagonoid, all closely adjacent. Occiput without dorsal protuberance but with several large setae at extreme vertex. Frons with 10–14 setae. Labella ellipsoid and pointed apically, each with several lateral setae. Palpus 3-segmented. Male antennal flagellomeres (Fig. 61) binodal; one circumfilum present on basal node, two on the distal node, the loops of the three circumfila subequal in length, short, reaching only half way to next circumfilum. Female flagellomeres (Fig. 60) cylindrical, surrounded by two appressed circumfila connected by two longitudinal bands and with necks about as long as wide.

Thorax: Wing (Fig. 59) with light and dark pattern; R_5 curved apically, joining C posterior to wing apex; Rs incomplete, much closer to arculus than to apex of R_1. Tarsal claws (Fig. 62) each with 1 large and 2 smaller teeth, curved near basal third; empodia not attaining bend in claws; pulvilli slightly shorter than empodia.

Male abdomen: First through sixth tergites entire, rectangular, with mostly single posterior row of setae, several lateral setae, extensive covering of scales, and 2 anterior trichoid sensilla; seventh tergite weakly sclerotized mesoposteriorly, with several setae on posterolateral margin, several lateral setae, scattered scales, and anterior pair of trichoid sensilla; eighth tergite weakly sclerotized, the only vestiture the anterior pair of trichoid sensilla. First through eighth sternites rectangular, covered with setae and with 2 anterior trichoid sensilla. Genitalia (Figs. 63–64): cerci tapering gradually from base to narrowly rounded apex, with numerous marginal setae especially laterad; hypoproct about as long as cerci, widening gradually from base to apex, the posterior margin slightly concave mesally with many ventral preapical setae; aedeagus about as long as hypoproct, tapering gradually from base to narrowly rounded apex, with longitudinal rows of sensory pits; gonocoxite cylindrical with slight, obtuse, mesobasal lobe; gonostylus in dorsoventral view broadest near midlength, tapering beyond, with setulae on basal fourth, covered beyond with minute carinae and scattered short setae.

Female abdomen: First through seventh tergites entire, rectangular, with mostly single row of posterior setae, several lateral setae, extensively covered with scales, and with 2 anterior trichoid sensilla. Eighth tergite smaller than seventh, less strongly sclerotized, with several widely spaced posterior setae and anterior pair of trichoid sensilla the only vestiture. Second through seventh sternites quadrate, extensively covered with setae and scales and with anterior pair of trichoid sensilla, eighth sternite weakly discernable, somewhat longer than corre-

sponding tergite, covered with setae on posterior half and with pair of anterior trichoid sensilla. Ovipositor (Figs. 65–66): only slightly protrusible, eighth tergum about 2× as long as its tergite, bare except on tergite; ninth segment bare dorsally, setose laterally and ventrally on posterior half, cerci ovoid, with pair of large, apical sensory setae and scattered setae elsewhere, hypoproct short, broad, with several posterior setae.

Pupa.—Head (Fig. 69): Antennal horns elongate, widely separated, each tapering to two unequal points; cervical sclerite with papillae situated on two prominences, each with seta as long as antennal horn; face without ventral projections, with 2 papillae, each with short seta, at base of labrum, and with group of 3 papillae, each with short seta, near base of palpus. Prothoracic spiracle elongate. Abdominal second through eighth tergites anteriorly with several irregular horizontal rows of pigmented spines, tergal surface covered elsewhere with uniformly small spicules.

Third larval instar.—White. Integument roughened. Antenna about twice as long as wide. Spatula (Fig. 67) broadest anteriorly, anterior margin with 2 widely separated teeth near middle, otherwise weakly serrate. Lateral thoracic papillae in 2 groups of 3 on each side of central line, 2 papillae in each group with tiny seta. Dorsal and pleural papillae with short setae, their length barely surpassing width of spiracles. Terminal segment (Fig. 68) with pair of papillae greatly enlarged into pair of caudal hooks, the 6 remaining papillae each with short seta.

Type species.—*Mikaniadiplosis annulipes* Gagné.

Etymology.—The name *Mikaniadiplosis* is a combination of the host plant generic name and "diplosis," commonly used as a suffix when naming genera of the supertribe Cecidomyiidi. The suffix refers to the two-noded male flagellomeres. The name is feminine.

Remarks.—The new genus is briefly characterized by the following adult characters: a dorsal occipital protuberance is lacking, the male flagellomeres have generally short internodes, necks, and circumfila, the palpi are reduced to three segments, wing vein Rs is much closer to the arculus than to the end of R_1, the tarsal claws have multiple teeth, the gonocoxites are splayed apart, and the male hypoproct is unique for being much wider at its apex than base. The female abdomen is unmodified, the seventh segment not reduced and the ovipositor barely protrusible. The larva, with its pair of large, corniform terminal papillae and three pairs of setose papillae, suggests *Contarinia,* except that the corniform papillae are never so large in *Contarinia.*

In the key to genera in Gagné (1994), *Mikaniadiplosis* will not run past couplet 29, unless one ignores the three-toothed claws, in which case the genus will run to couplet 40. To make a place for the new genus in the key, one can add a new couplet there by changing couplet "40" to "40a," deleting the last line of the second half of the couplet, adding "40b" at the end, and inserting the following new couplet after 40a:

40b. Occipital protuberance present; palpus 4-segmented; Rs equidistant between arculus and end of R_1; gonocoxite with large mesobasal lobe; male hypoproct no broader than cercus . . . . . *Dactylodiplosis*

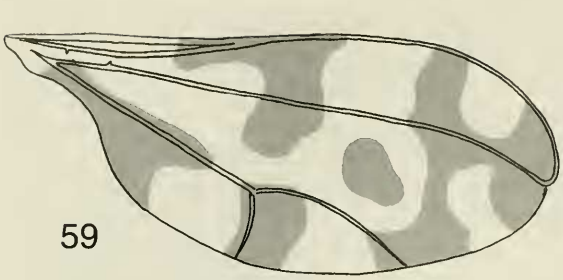
– Occipital protuberance absent; palpus 3-segmented; Rs much closer to arculus than to end of R_1; gonocoxite with only slight mesobasal lobe; male hypoproct as wide as both cerci . . . . . *Mikaniadiplosis*

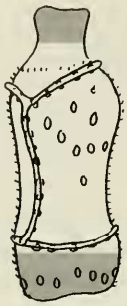
In addition, the second half of couplet 37 would need "palpus four-segmented" changed to "palpus three- or four-segmented" to accommodate *Mikaniadiplosis.*

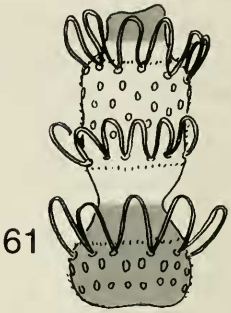
Mikaniadiplosis annulipes Gagné, new species

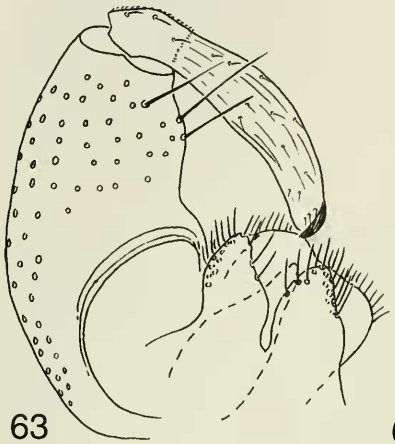
(Figs. 59–69)

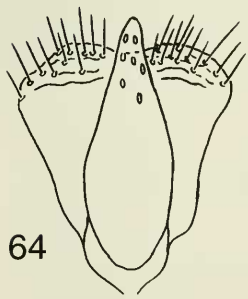
Adult.—*Head:* Male antennal flagellomeres (Fig. 61) dark on basal node and distal half of neck, light elsewhere. Female fla-

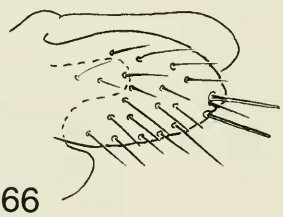


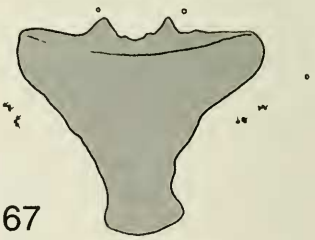


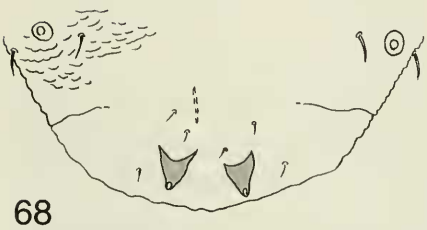


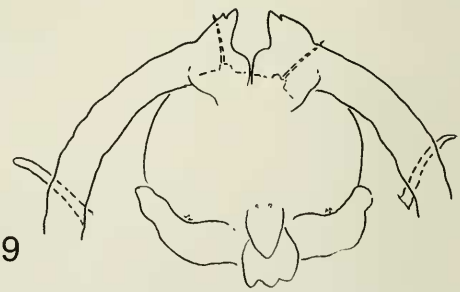




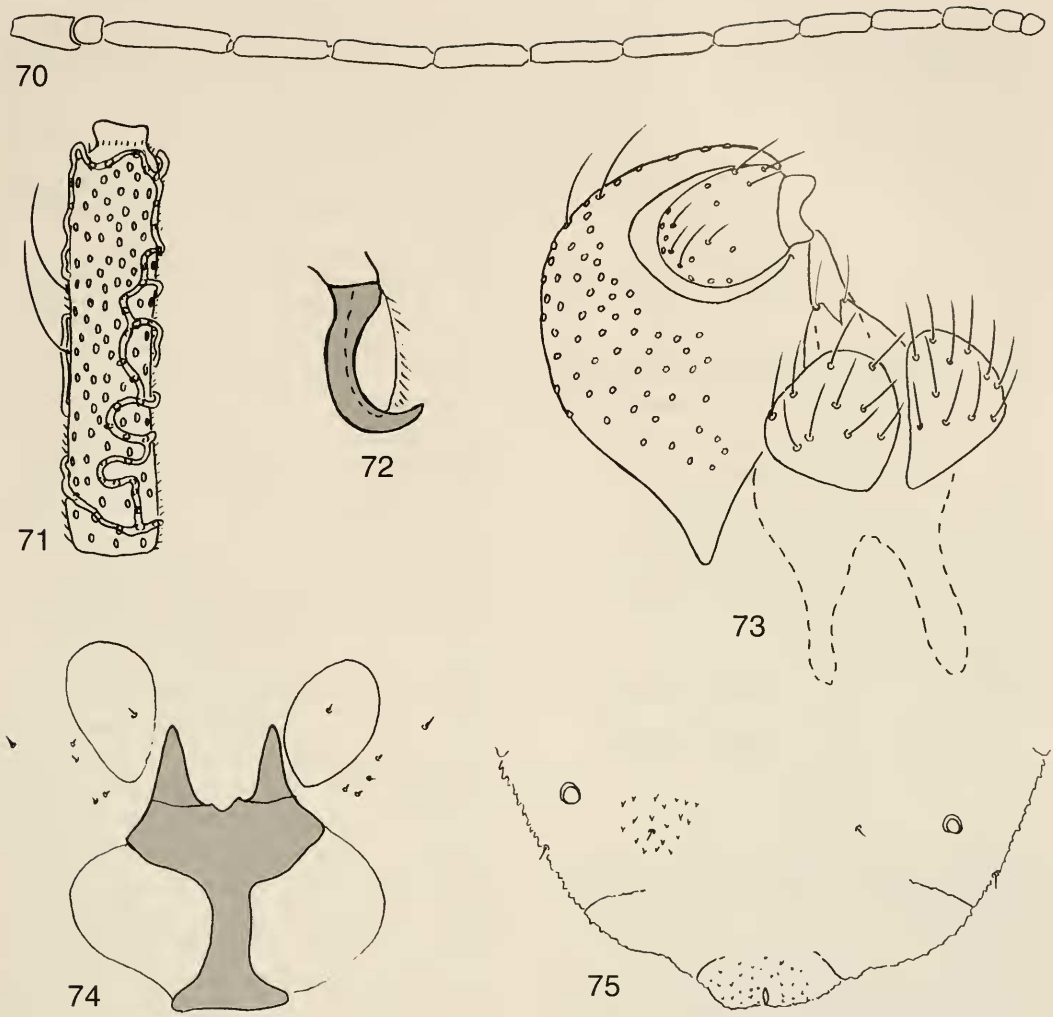








Figs. 59–69. *Mikaniadiplosis annulipes.* 59, Wing. 60, Female third flagellomere. 61, Male third flagellomere. 62, Foretarsal claw and empodium. 63, Male genitalia (dorsal view). 64, Aedeagus and hypoproct (ventral). 65, Female postabdomen, seventh tergite to cerci (dorsolateral). 66, Detail of female cerci and hypoproct (lateral). 67, Larval spatula and associated papillae. 68, Larval eighth and terminal segments (dorsal). 69, Head of pupal exuviae (ventral).



Figs. 70–75. *Perasphondylia mikaniae.* 70, Silhouette of female antenna. 71, Female third flagellomere. 72, Foretarsal claw and empodium. 73, Male genitalia (dorsal). 74, Larval spatula and associated papillae. 75, Eighth and terminal larval segments (dorsal).

gellomeres (Fig. 60) dark on basal third and distal half of neck, light elsewhere.

Thorax: Wing (Fig. 59) with alternating light and dark areas; length, 2.5–2.7 mm (n = 2) in male, 2.9–3–7 (n = 4) in female. Legs with alternating light and dark color pattern. Tarsal claws as in Fig. 62.

Male abdomen: Genitalia as in Figs. 63–64.

Female postabdomen: As in Figs. 65–66.

Pupa.—Head as in Fig. 69.

Third larval instar.—Spatula as in Fig. 67. Posterior segments as in Fig. 68.

Holotype.—Male, from petiole swelling on *Mikania glomerata,* Rio de Janeiro, RJ, Brazil, XI-1998, deposited in Museu Nacional do Rio de Janeiro.

Other material examined (all from leaf vein or petiole swellings on *M. glomerata,* Rio de Janeiro state, Brazil).—1 ♂, 2 ♀, 4 pupal exuviae, same data as holotype; 1 ♀, 1 pupal exuviae, Silva Jardim, Poço das Antas Biological Reserve; 1 ♂, 2 pupal ex-

uviae, Parati; larva, Parati, XI-1998; 1 ♀, 1 pupal exuviae, Parati, 6-VII-1996; 2 larvae, Rio de Janeiro, 6-VII-1996; 3 larvae, Teresópolis, VIII-1999.

Etymology.—The specific name *annulipes* is an adjective meaning "banded leg" that refers to the striking light and dark pattern of the legs of this species.

Gall (Fig. 4).—The gall of *M. annulipes* is an elongate, swelling of the leaf veins on either surface, and of the petioles and young branches. Mature larval chamber walls are slightly rigid and surrounded with spongy tissue. When young the gall appears to be a simple blister but as it matures develops the characteristic spongy texture. The exterior color is green, similar to that of the leaves. One or more larvae may be found in a gall, where they pupate and eventually emerge from an opening near either end of the gall. The gall was fairly abundant in each of the collecting localities.

Perasphondylia mikaniae Gagné, new species

(Figs 30–31, 70–75)

Adult.—*Head:* Antenna (Figs. 70–71) with scape slightly more than twice length pedicel; pedicel slightly wider than long; first flagellomere of male about 1.5 times longer than scape, that of female more than twice length of scape. Eye facets hexagonal, closely approximated. Frons with approximately 35–40 setae. Clypeus asetose dorsally, with several short setae laterally, and setulose ventrally. Hypopharynx closely lined with short setae dorsally. Labella setose and setulose laterally and ventrally, with a patch of short setae mesally. Palpus 3 segmented, first segment about as long as wide, second segment about twice as long as wide, third about 3 times as long as wide, all covered with setulae and setae.

Thorax: Wing length, male 3.2 mm (n = 3), female 4.1–4.4 (n = 5). Dorsocentral setal row at midlength with three rows of setae intermixed with several scales, the row continuing onto scutellum to posterior margin. Scutellum bare between dorsocentral rows of setae, with posterior setae laterad of dorsocentral rows, and covered with scales laterally. Anepisternum with setae and scales on dorsal half to two-thirds. Anepimeron covered with setae. Katepimeron bare. Tarsal claws (Fig. 72) subequal in size and similar in shape, as long as empodia.

Abdomen: Tergites without anterior pair of trichoid sensilla, first through seventh tergites rectangular with mostly single row of posterior setae, many lateral setae, elsewhere covered with scales, width of sixth and seventh tergites about 2½ times length; eighth tergite short, bandlike, without vestiture. Sternites without anterior pair of trichoid sensilla, width of sixth sternite about twice length, male eighth sternite reduced in size, as wide as long. Male genitalia as in Fig. 73. Distal half of ovipositor approximately twice length seventh sternite.

Pupa (Figs. 30–31).—Antennal horns dorsoventrally flattened, acute apically, mesal edge serrate. Frons with elongate, pointed upper horn and three-pointed lower horn, the mesal much shorter than the lateral points. Abdominal tergites 2–8 each with, from posterior margin, a row of stout spines, a short bare space, another row of stout spines followed by two or three irregular horizontal rows of scattered, generally smaller spines, these diminishing in size and growing sparser toward anterior margin of sclerite.

Larva.—Spatula (Fig. 74) with two large, widely separated, anterior teeth, the space between sometimes minutely serrate. Sternal, the 4 pairs of lateral, and the pair of ventral papillae are with setae. Terminal papillae not distinguishable from spicules (Fig. 75).

Holotype.—Male, from bud gall on *Mikania glomerata,* Silva Jardim, Poço das Antas Biological Reserve, RJ, XI-1997, Oda & Monteiro, deposited in Museu Nacional do Rio de Janeiro.

Other material examined (all from bud galls on *M. glomerata,* Rio de Janeiro state, Brazil).—1 ♂, 6 ♀, 6 pupal exuviae, same

data as holotype; 1 ♂, 3 ♀, 4 pupal exuviae, same data as holotype except 6-XII-1996; 1 ♂, 5 ♀, 6 pupal exuviae, same data as holotype except XII-1997; 2 pupa exuviae, Parati, VII-1997; 5 larvae, Parque Nacional do Itatiaia.

Etymology.—The specific name *mikaniae* is the genitive of the host plant name.

Gall (Fig. 8).—*Perasphondylia mikaniae* forms a bud gall on the terminal and axilary buds of young stems of *M. glomerata.* It causes an extreme foreshortening of the stem on which the leaves become concentrated to form a rosette. Stem growth does not proceed beyond the gall. The galls contain several to as many as thirty ovoid cells, each inhabited by one larva. Pupae escape from holes near the gall apex. The gall was found in most of the collecting localities but was the least abundant kind of gall found.

Remarks.—The only other described congener, *Perasphondylia reticulata* Möhn, is known from bud galls on *Chromolaena odorata* L. (K.&R.) collected in Trinidad, El Salvador, and Ecuador. Both species are relatively large and similar in the adult stage, although available specimens show slightly smaller male hypoproct lobes in the new species. The pupal upper frontal horn is undivided and stronger in the new species, divided and not so robust in *P. reticulata.* Both species have 3-pointed lower frontal horns, but in the new species the middle point is much shorter than the other two, while in *P. reticulata* all the points are the same length. The larva of *M. mikaniae* has four lateral papillae, while that of *P. reticulata* has five. The terminal larval papillae are not visible in the new species but apparent in *P. reticulata.*

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Literature Cited

Cortopassi-Laurino, M. and M. Ramalho. 1988. Pollen harvest by africanized *Apis mellifera* and *Trigona spinipes* in Sao Paulo (Brasil) botanical and biological viewes. Apidologie 19: 1–24.

Gagné, R. J. 1989. The Plant-Feeding Gall Midges of North America. Cornell University Press, Ithaca, New York. xi and 356 pp. and 4 pls.

Gagné, R. J. 1994. The Gall Midges of the Neotropical Region. Cornell University Press, Ithaca, New York. xv and 352 pp.

King, R. M. and H. E. Robinson. 1987. The Genera of the Eupatorieae (Asteraceae). Missouri Botanical Garden, St. Louis. 581 pp.

McAlpine, J. F., B. V. Peterson, G. E. Shewell, H. J. Teskey, J. R. Vockeroth, and D. M. Wood (eds.). 1981. Manual of Nearctic Diptera. Vol. 1. Research Branch, Agriculture. Canada Monograph No 27. vi + 674 pp.

Möhn, E. 1960. Gallmücken (Diptera, Itonididae) aus El Salvador. 2. Teil. Senckenbergiana Biologica 41: 197–240.

———. 1964. Gallmücken (Diptera, Itonididae) aus El Salvador. 7. Teil: Lasiopteridi. Beiträge zur Entomologie 14: 553–600.

———. 1973. Studien über neotropische Gallmücken (Diptera, Itonididae). 2. Teil. Stuttgarter Beiträge zur Naturkunde (A) 257: 1–9.

Monteiro, R. F., F. F. F. Ferraz, V. C. Maia, and M. A. P. de Azevedo. 1994. Galhas entomógenas em restingas: uma abordagem preliminar. Atas do III Simpósio de Ecossistemas da Costa Brasileira Vol. III (ACIESP No. 87): 210–220.

Oliveira, F., G. Akisue, M. K. Akisue, B. Mancini, and M. Chumzum. 1987. Morfodiagnose de axófito de guaco—Mikania gloverata Spreng. Revista de Ciências Farmacêuticas, Araraquara 8/9: 11–24.

Rübsaamen, E. H. 1907. Beiträge zur Kenntnis aussereuropäischer Zoocecidien. III. Beitrag. Gallen aus Brasilien und Peru. Marcellia 6: 110–173.

———. 1916. Beitrag zur Kenntnis aussereuropäisch-

er Gallmücken. Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin 1915: 431–481.

Skuhravá, M. 1989. Taxonomic changes and records in Palaearctic Cecidomyiidae (Diptera). Acta Entomologica Bohemoslovaca 86: 202–233.

Tavares, J. S. 1909. Contributio prima ad cognitionem cecidologiae Braziliae. Brotéria, Série Zoológica 8: 5–28, pls. I–VIII.

Wünsch, A. 1979. Gallenerzeugende Insekten Nordkolumbiens, speziell Asphondyliidi und Lasiopteridi (Diptera, Cecidomyiidae) aus dem Küstenbereich um Santa Marta. A. Wünsch, Waiblingen, West Germany. 238 pp.